WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: 2005SC11B

Title: Toxicological effects of endocrine disrupting compounds in Lake Conestee and the Reedy River

Project Type: Research

Focus Categories: Water Quality, Toxic Substances, Surface Water

Keywords: Environmental Risk Assessment, Human Health Risks, Biomarkers, Toxic Waste Water, Remediation, Fish Toxicology

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Congressional District: 3rd

Principal Investigators:
Peter van den Hurk

David Hargett

Stephen Klaine

Abstract

Problem:

The Reedy River originates as a pristine stream just north of Greenville in the foothills of upstate South Carolina. Throughout its course down to Lake Greenwood, it receives contaminant influxes from agricultural, urban and non-point sources. Historically a large amount of contaminants has been released into the Reedy River in the city of Greenville, and much of this contaminant load has accumulated in Lake Conestee, just south of Greenville. Lake Conestee is a heavily polluted Superfund (Targeted Brownfields Program) site in the Reedy River watershed. The lake, formerly 145 acres, has been silted in to such extent that it now is comprised of about 20 acres of water area, the remainder being emergent wetlands, sloughs, beaver ponds, and wooded bottomland flats. The sediments and overlying water column contain high concentrations of nutrients, heavy

metals, polynuclear aromatic hydrocarbon pollutants, pesticides and PCBs. Contamination investigations sponsored by U.S.EPA, SCDHEC, and the Corps of Engineers have established the nature of contamination of the lake sediments. However, little is know about the dispersion of the contaminants, and even less is known about concentrations and toxicological effects of these contaminants in the organisms in the lake. This has not only caused concern about the environmental health of the system, but also potential effects on human health of people consuming fish, turtles and other game species from the lake. Even less is known about the extent of the contamination further downstream of Lake Conestee. This is of particular concern for Lake Greenwood, which forms the drinking water reservoir for Greenwood County . Episodic flooding of Lake Conestee, and a dam failure in recent years, are likely processes that allow transport of contaminated water and sediment downstream. Recent results of toxicological investigations have demonstrated that in Lake Conestee and in Boyd Mill Pond, 25 miles downstream, elevated levels of several biochemical and histological biomarkers for contaminant exposure were found in largemouth bass.

Objectives and methods:

To further investigate the observed toxicological effects in the reservoirs in the Reedy River, a study is proposed to measure the effects of endocrine disrupting compounds that are released into the Reedy River by sources like the Greenville waste water treatment plant, located just upstream of Lake Conestee. Largemouth bass will be collected in different seasons from several locations in the Reedy River watershed and an un-impacted control site, and will be analyzed for unnatural estrogenic effects such as egg yolk protein production in male fish, excretion of estrogenic compounds in bile and inhibition of steroid hormone metabolizing enzymes. This information, combined with chemical, ecological, and whole organism toxicity data obtained in previous studies, will enhance the understanding of the extent of the contamination and its effects on biota and provide the foundation for an ecological risk assessment for the watershed. Further, it will generate data that will be used for human health risk assessment in people using resources in the watershed for nutrition and recreation.